Quarterly Report

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Contract Number: *DTPH56-05-BAA-0001*

Prepared for: *DOT-PHMSA-OPS, GTI-OTD, SoCal, BP*

Project Title: *Internal Corrosion Direct Assessment Detection of Water (WP#205)*

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The objective of this project is to develop sensors on the order of a few cm to a few inches in size that can be introduced into the gas stream that will then flow through the pipeline and detect the presence of water. In a separate design, these sensors would behave fluid dynamically similar to water and would accumulate at locations where water hold up occurs and determine the water corrosivity/corrosion rate at these locations. This type of information would reduce the total number of required excavations or eliminate the need to excavate the pipe altogether.

The overall approach is to develop and use thin-film sensors that can detect corrosion and mount them on "motes", a mobile, wireless networking system developed originally at University of California, Berkeley. Such a system could be used on both piggable and non-piggable pipelines to remotely detect (not just predict) the presence of water and corrosion. Thus far, the project has been focused on the following activities:

- finalize the corrosion sensor design maximizing sensor life without negatively impacting sensitivity
- sensor packaging has been modified due to unanticipated creep failures during long-term high pressure tests
- technologies to determine the location of the sensor along the pipeline have been explored and are being incorporated into the overall sensor design
- the sensor electronics have been designed and the fabrication layout completed
- initial low pressure flow loop testing of mock sensors has demonstrated that the sensors will flow in the gas stream
- a sensor injection and retrieval system was designed and successfully tested
- a high pressure pipeline test has been conducted in which the sensor successfully moved through the pipe based on gas flow
- technology to track sensor location within the pipe was demonstrated
- preparation for two field trials are underway

Future activities will include field trials in operating pipelines.